Attachment A: Statement of Work

1.1 General

The selected Proposer shall complete the following scope of work:

1.1.1 Scope shall include a "turnkey" system that includes all engineering, design, materials, labor, equipment, trenching, paving, electric panels, breakers, services, permits and permitting, inspections, approvals, environmental compliance, taxes, financing, design, procurement, installation, construction, operation, maintenance, monitoring, billing, and incidentals necessary to install, operate and maintain a complete solar photovoltaic electrical generation system as specified hereinafter, and including, but not limited to, the work included in this Opportunity Notice.

1.1.2 The Proposer will be responsible for the delivery of electricity to LSO/LLNL under a long-term power purchase agreement. LSO/LLNL intends to contract for electricity from the solar PV generation system for a 20-year contract term, utilizing Western Area Power Administration (Western).

1.1.3 At a minimum, the system shall consist of the supply and installation of a ground-mounted solar photovoltaic electrical generation system, mounting structure, terminal and combiner box(es), quick-connect electrical connectors, conduit, DC wiring, DC disconnect, grid-connected inverter, AC disconnect, AC wiring, all advanced metering equipment, a system monitoring and data retrieval system, and everything necessary to interconnect with LLNL's electrical distribution system.

1.1.4 A pre-feasibility evaluation determined that a solar array of approximately 2-5 MW was feasible. Each Proposer is responsible for ascertaining relevant site conditions and making its own findings as to site conditions and appropriate system size during the site visits.

1.1.5 All current California Building Codes and all other applicable codes shall apply. The system shall be designed to meet all applicable Local, State, and Federal seismic and wind-load requirements.

1.2 Solar Electricity Generation System Design

1.2.1 The ground-mounted solar photovoltaic system will be installed at DOE's LLNL Site 200 (Livermore location) on approximately 10 acres of DOE-owned federal property in the northwest buffer zone near the LLNL West Gate Badge Office. Attachment B identifies the proposed site boundaries, the electrical connection point, required setbacks from existing security fencing and a drainage ditch, and construction and maintenance access locations.

1.2.2 The system shall be designed to be terminated at, or very close to, the LLNL security fence at a position closest for interconnection to LLNL's 13.8 kV existing electric utility distribution system at Power Manhole P-186, for connection to switchgear LGS19. Proposers should include all metering and monitoring equipment and modifications required to provide AC power at both the termination point and interconnection to LGS19 in their bid, including anticipated requirements based on the required interconnection studies. LSO/LLNL personnel shall be responsible for the physical electrical connection and materials from P-186 to LGS19. If Proposer determines that an alternative interconnection route between the system and LGS19 is more advantageous, the

Proposer may include an alternative design in addition to the above specified design. Attachment K provides LLNL electrical material specifications.

1.2.3 While the 13.8 kV electric utility distribution system is owned by LSO/LLNL, the interconnection must comply with Western's metering and interconnection standards. The proposed system must include all provisions to provide safe, reliable power that is fully integrated with LLNL's electric utility distribution system.

1.2.4 Major electrical components, including the inverter, isolation transformer, and switchgear, or metering located outdoors shall be installed in exterior-rated (NEMA 4) enclosures.

1.2.5 A system monitoring and data acquisition system shall be furnished and installed and be available remotely to LSO/LLNL through a real-time internet site capable of tracking, but not be limited to, the following: site-specific actual kWh production (average and cumulative totals), site-specific instantaneous maximum kWh production, actual meteorological data, solar irradiance, ambient and module temperature, and capacity factor, as well as access to the PV system's historical data.

1.2.6 Civil, Structural, and Electrical engineering analysis and documentation (stamped and signed by a Civil, Structural or Electrical Engineer registered in the State of California) shall be provided certifying that the solar photovoltaic system can support any loads resulting from local applicable seismic and wind-load activity.

1.3 Environmental Permitting

1.3.1 LSO/LLNL has completed a Categorical Exclusion for this proposal in compliance with the National Environmental Policy Act (NEPA).

1.3.2 LSO/LLNL is consulting with the US Fish and Wildlife Service (FWS) in compliance with the Endangered Species Act (ESA). Proposers are responsible for implementing conservation and avoidance measures (such as erecting silt fencing around worksite and daily inspections of excavated areas) identified in the 2012 Biological Assessment and forthcoming Biological Opinion issued by FWS. Electronic copies of all monitoring reports and findings shall be provided to LSO/LLNL.

1.3.3 Proposers are responsible for implementing best management practices for compliance with the Migratory Bird Treaty Act (MBTA). Electronic copies of all monitoring reports and findings shall be provided to LSO/LLNL.

1.3.4 Proposers are responsible for coordination with LSO to comply with Section 106 of the National Historic Preservation Act (NHPA). The worksite area is not known to have had past earth disturbance (excavations) deeper than two feet. While archaeological resources have not been encountered at the LLNL Livermore site, significant paleontological resources have been unearthed. Proposers are responsible for monitoring ground-disturbing activities for archaeological and paleontological resources. Electronic copies of all monitoring reports and findings shall be provided to LSO/LLNL.

1.3.5 Proposers are responsible for preparation and submittal to the state of a Storm Water Pollution Protection Plan (SWPPP), including inspections, sampling, and monitoring during all phases of construction and operations.

1.3.6 LSO/LLNL has completed pre-construction soil characterization and determined that excess soil meets site reuse criteria and may be disposed of at the worksite.

1.4 Fire Marshal Requirements

1.4.1 Proposer shall complete a design in accordance with the recommendations contained in NFPA 850, Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations.

1.4.2 Construction operations shall be in accordance with NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.4.3 Vegetation shall be modified or removed to mitigate hazardous conditions of fire exposure for a space within 20 feet of the footprint of the ground mounted solar photovoltaic system.

1.5 Site Access, Access Control, and Security

1.5.1 LSO/LLNL may limit or restrict the right of access to the LLNL worksite in any manner necessary for national security emergencies, site emergency, or other emergency situations as required. In the event of such emergencies, the Proposer would be notified immediately and provided access to the worksite as soon as possible as dictated by such emergency and emergency response. At all other times, the Proposer would have access to the site in accordance with security and access control standards and procedures.

1.5.2 Proposer, subcontractor, and vendors shall adhere to security and access control standards and procedures, including badges, required by LSO/LLNL.

1.5.3 Proposer shall have construction access to the worksite at West Gate Drive prior to the badge kiosk. Normal operating hours of West Gate Drive are Monday through Friday from 6:00am to 6:00pm. Large deliveries should be made during non-peak hours.

1.5.4 Proposer is responsible for median and construction access improvements and return to previous condition at worksite access on West Gate Drive. Proposer is responsible for construction of an approximately 200’ x 6’ black vinyl-coated chain-link security fence to be located at the north east corner of the worksite. Maintenance and operations personnel may access the worksite through an existing access gate on Vasco Road. See Attachment B for these locations.

1.6 Meetings and Coordination

1.6.1 Proposers are expected to provide a dedicated Site Project Manager who will guide the implementation of the project from contract execution through to operation. LSO/LLNL will expect regular meetings and sufficient documentation during the project implementation to verify progress against a schedule and to effectively identify and resolve issues during the implementation process. The contractor must maintain on-site project management/supervision whenever work is proceeding on site.

1.6.2 Proposer’s Site Project Manager shall also coordinate with LSO/LLNL’s designated agent throughout the term of the project. The LSO/LLNL designated agent will act as a liaison to coordinate activities and report as advised on Project progress (scope, costs, issues, and schedule) to LSO/LLNL. The Proposer shall be responsible for paying the cost of the LSO/LLNL designated agent. For planning purposes, this cost is expected to be approximately 2-3% of the total project delivery cost.

1.7 Submittals

1.7.1 Preliminary design stage. The following information shall be submitted to LSO/LLNL for review at the preliminary design stage:

1. Preliminary solar photovoltaic system layout and site plans.
2. Overall system description including dimensions, type of ground-mounted installation
3. Description of the anchorage structures showing details of how the system will be anchored.
4. Estimate of system annual electricity output.
5. A summary of all anticipated permits and approvals that will be required for the proposed project, including governing agency, type of approval required, and timeframe for completion.
6. Selection of key equipment, including panels, inverters, transformers, etc.
7. Implementation and completion schedule.
8. Product data sheets: Equipment data sheets.
9. Worker Health and Safety Plan (Section 1.10).

1.7.2 System design submittal will include, but not be limited to, the following:

1. Site plan
2. System layout
3. System schematics
4. System capacity calculations
5. System single line electrical diagram
6. Point of interconnection single line electrical diagram
7. Construction documents—plans, elevations, sections, details, specifications, etc.
8. Structural calculations and structural and mounting details
9. Wind loading and seismic calculations
10. List of equipment and materials schedule
11. Manufacturers' data and cut sheets for all major equipment
12. Site Survey
13. Geotechnical report

1.7.3 The Proposer shall be responsible for the completeness, accuracy, and coordination of all submittals and shall not delegate such responsibility in whole or in part to subcontractors or suppliers.

1.7.4 The Proposer shall review and check all submittals before submitting them to the LSO/LLNL. It is considered reasonable that the Supplier shall make a complete and acceptable submittal to the Site Project Manager at least by the second submission of data.

1.7.5 75%-design stage. The following submittals, as requested, will be submitted to LSO/LLNL for review, and comments resolved by Proposer at no expense to LSO/LLNL:

1. Complete construction plans and details (at the 75% level) for the solar photovoltaic system layout, including foundation and anchorage details, equipment details, dimensions, grading and site improvements, conduit raceways, conduit sizes, inverter location and interconnection, transformer location and interconnection, electrical interconnecting diagrams, etc.
2. Status summary of all required permits and approvals (indicate which have been approved, which are pending, etc.).
3. Product warranty descriptions.
4. Detailed procedure for completing the electrical interconnection.

5. Calculations including power sizing, voltage loss, and inefficiencies.
6. Grading and drainage plans.
7. Single line diagrams indicating system layout and all required connections LLNL's distribution system, specifying the inverter models and ratings.
8. Drawings and description of all controls, monitors, and instrumentation.
9. Detailed description of the web-based performance monitoring system.
10. Inverter data sheets and factory testing results for the inverter(s).

1.7.6 100%-design stage. The following submittals, as requested, will be submitted to LSO/LLNL for review, and comments resolved by Proposer at no expense to LSO/LLNL:

1. Complete construction plans and details (at the finalized level) for the solar photovoltaic system layout, including foundation and anchorage details, equipment details, dimensions, grading and site improvements, conduit raceways, conduit sizes, inverter location and interconnection, transformer location and interconnection, electrical interconnecting diagrams, etc.
2. Professional Engineer verification and certification that the system will meet all applicable Local, State, and Federal seismic and wind-load requirements per the Specification.
3. Professional Engineer design, evaluation, and certification of the anchorage structure, which must be signed and stamped by a Professional Engineer in the appropriate discipline.
4. Copies of all finalized Permits. All permits shall be in the Supplier's and/or Installation Contractor's name.
5. Submit concrete support details including rebar details and dimensions for all concrete pads and foundations.

1.7.7 Submittals due post-construction:

1. All finalized submittals shall be furnished in hardcopy and electronic formats (drawings in Autocad and other documents in Adobe PDF).
2. All as-built information shall be submitted in Adobe PDF and AutoCAD format.
3. Completed system start-up and testing data sheets.

1.8 Quality Assurance

1.8.1 All generating equipment shall be certified by Underwriter Laboratories (UL). The system shall be comprised of UL listed components or in cases where a UL listed component is not available; the component shall be listed by another OSHA recognized National Recognized Testing Laboratory (NRTL).

1.8.2 All installations shall meet or exceed Fed-OSHA requirements for safety and equipment access.

1.8.3 The design, construction, and finalized installation shall be completed in accordance with the latest applicable version of the National Electrical Code (NEC), California Building Code (CBC), International Building Code (IBC), American Society of Civil Engineers (ASCE), American Society of Mechanical Engineers (ASME), American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), Underwriters Laboratory (UL), Institute of Electrical and Electronics Engineers (IEEE), American Concrete Institute (ACI), National Fire Protection Association (NFPA), Federal Occupational Safety and Health (Fed-OSHA) (specifically 29 CFR 1926 OSHA Standards for Construction Industry, 29 CFR 1910, OSHA Standards for General

Industry, and DOE Order 232.2 Occurrence Reporting and Processing of Operational Information), all Federal, State, and Local construction and interconnections codes and all other codes required by the CSI, and all other incentive and rebate programs.

1.9 Installation Contractor Experience

1.9.1 The Supplier and/or Installation Contractor shall hold appropriate contractor's license in the State of California for all phases of system construction and shall be approved by the equipment manufacturer to install each component. Additionally, the firm or its subcontractors shall be licensed in the State of California to perform any and all ancillary work that may be required, including but not limited to concrete, trenching, etc.

1.10 Safety-Related Requirements

1.10.1 The Worker Safety and Health Program (10 CFR 851) regulation enacted by the US Department of Energy (DOE) applies to work performed at LLNL worksites by its subcontractors. The selected Proposer shall meet these requirements. The Proposer shall also meet the requirements of 29 CFR Part 1904, Recording and Reporting Occupational Injury and Illness.

1.11 LSO/LLNL Training Requirements

1.11.1 All subcontractor personnel will be required to complete Natural Resources training, Security and Site Access training, and other training courses necessary for performing work at LLNL.

1.12 Materials

1.12.1 General

1. All aspects of construction shall meet the more stringent of Federal, State, and Local building codes (see Section 1.8.3).
2. All components shall be new and direct from the respective manufacturer; used or refurbished materials are not permitted.
3. Materials and installation shall be designed to withstand the year-round temperatures and conditions to which they are exposed (sunlight, heat, rain, cold, etc.).
4. All structural components shall be designed in a manner commensurate with attaining a minimum 30 year design life.
5. All required disconnect and over-current protection devices shall be included in the system and accessible for maintenance.
6. All systems shall include all equipment necessary to interconnect with the utility and meet all of the utility's requirements for protection equipment, etc.

1.12.2 Modules

1. PV modules specified must be listed on the California Energy Commission's PTC list and must qualify for eligibility under the California Solar Initiative.
2. System must comply with IEEE 1262 "Recommended Practice for Qualifications of Photovoltaic Modules".
3. Modules may use crystalline silicon or thin film/amorphous technologies.

1.12.3 Electric Power Requirements:

1. Power provided must be compatible with the onsite 13.8 kV electric utility distribution system.
2. Power capacity should be measured at the inverter AC output using the PVUSA Test Conditions (PTC), i.e. 1,000 Watts/m 220 degree C ambient temperature and wind speed of 1 m/s.
3. Systems must be designed and installed using UL or NRTL listed components, where applicable.
4. Inverters must comply with the following requirements:
   - IEEE 929-2000 – "Recommended Practice for Utility Interface of Photovoltaic Systems" and
   - UL 1741 – "Standard for Static Inverters and Charge Controllers for use in Photovoltaic Systems"
   - Listed on the CEC list of eligible inverters
5. All Balance of Systems (wiring, component, wiring, conduits, and connections) must be suited for conditions for which they are to be installed. Inverters shall be installed in all-weather enclosures (NEMA 4) suitable for exterior location. An interval data meter must be installed to measure the AC output of the inverter. This meter shall be located in close proximity to the existing billing meter and in a location accessible to LSO/LLNL personnel.

6. Interconnection must comply with "Rule 21" affecting the IOUs in California. Interconnection must be acceptable to the distribution utility. This shall be done at no cost or liability to LSO/LLNL.

1.12.4 Structural Requirements

1. All structures, including array structures, shall be designed to resist dead load, live load, plus wind and seismic loads to the geographic area.
2. Solar photovoltaic systems must be able to withstand wind speeds of at least 95 mph.
3. Thermal loads caused by fluctuations of component and ambient temperatures must be combined with all the above load combinations.
4. All structural components, including array structures, shall be designed in a manner commensurate with attaining a minimum 30 year design life. Particular attention shall be given to the prevention of corrosion at the connections between dissimilar metals.

1.12.5 Metering

1. Revenue grade Interval Data Recording (IDR) meters shall be provided complete with industry standard telemetry for communication with Ethernet, cellular or other common output capabilities.

1.13 Installation

1.13.1 General Material and Installation Requirements

1. All safety, electric, building, and labor code requirements at the Federal, State, and Local levels shall be met including OSHA requirements and 10 CFR 851.
2. The installation shall be completed in a "workman-like manner", within commonly accepted construction practices and industry standards. The area shall be kept clean and free of obstructions at all times.
3. The installation shall be completed per the Manufacturer's written installation manual.

4. The installation shall be completed without affecting existing piping, conduit.
5. All cables, conduit, exposed conductors, and electrical boxes shall be secured and supported according to code requirements.
6. All applicable environmental regulations shall be met.
7. The Supplier shall obtain all required permits.
8. The Supplier may make exploratory investigations and/or excavations, as it deems necessary, at the planned locations for foundation analysis, prior to preparing the foundation design.

1.13.2 SYSTEM ELECTRICAL

1. Electrical construction shall meet all Federal, State, and Local electric codes.
2. All outdoor panel enclosures shall be weatherproof and capable of surviving intact under the site environmental conditions.
3. All electrical/electronic equipment shall have surge and lightning protection. All electrical/electronic equipment and metal surfaces shall be properly grounded as required in the NEC and as required by the equipment manufacturer for protection of personnel and equipment due to fault.
7. Other technical codes that will apply include:
   - AMSE PTC 50 (solar PV performance)
   - ANSI Z21.83 (solar PV performance and safety)
   - NFPA 853 (solar PVs near buildings)
   - NFPA 70 (electrical components)
   - NFPA 70e (electrical safety)
   - IEEE 1547 (interconnections)
   - National Electrical Safety Code – ANSI C2 - 2012
   - All applicable State Building Codes and requirements

1.13.3 INSTALLATION STANDARDS

1. The Supplier shall obtain appropriate certifications from a Professional Engineer for all structural, seismic, and wind-loading requirements for the specific application and provide them as part of the post-installation package.
2. System installation shall conform to Manufacturers' installation manuals and approved project drawings and specifications.
3. Mounting hardware shall be compatible with the site considerations and environment.

1.13.4 METERS, MONITORING, AND DATA ACQUISITION SYSTEM

1. The Supplier shall develop and provide a remote monitoring program that will allow the LSO/LLNL to monitor the performance of the solar photovoltaic electrical generation system on a vendor provided website in historical and real-time for the life of the equipment.
2. An Advanced Meter with a wire-line modem interface shall be installed on the AC output side of the PV system and must have an MV-90 xiV3 compatible Translation Interface Module (TIM) that integrates with the existing LSO/LLNL meter data collection system.

1.13.5 SYSTEM START-UP

1. All start-up and testing activities shall be witnessed by a LSO/LLNL's Project Manager, Construction Inspector, and/or other appropriate facilities personnel.

2. The Supplier shall thoroughly inspect the installation to ensure compliance with all applicable safety regulations and requirements and obtain approval of LSO/LLNL staff prior to operation.
3. Start-up shall be per all manufacturers' instruction.
4. The system shall be started-up and tested in accordance with the regulations of the SGIP and net metering programs.

1.13.6 Complete a system commissioning per the Specification and equipment manufacturer's written instructions. System commissioning shall meet all requirements of utility and state rebate programs.

1.13.7 Upon completion of the Work, and prior to final acceptance, the Supplier shall remove from the vicinity of the Work all surplus material and equipment belonging to the Supplier or used under its direction during construction. Comply with all permits, approvals, and submittals required by the State or Federal agencies having jurisdiction, and the local utility.

1.14 Maintenance

1.14.1 LSO/LLNL will not take responsibility for maintenance activities critical to the operation and output of the system. LSO/LLNL will assume that all maintenance is provided by the proposer except where explicitly identified in the Opportunity Notice response.

1.14.2 Proposals must include a half-day of training for Facilities Maintenance staff and other interested LSO/LLNL Personnel to promote understanding and monitoring of the system.